

CLAIMS

1. A fragment of a gene represented by SEQ ID NO: 1, which is a fragment of a gene (*gyrB*) encoding a DNA gyrase β subunit of SEQ ID NO: 1 in the sequence listing and contains one or more nucleotides at any of positions (also referred to as nucleotide numbers) 21, 96, 107, 126, 153, 190, 258, 270, 279, 285, 357, 543, 552, 557, 600, 690, 702, 714, 729, 733, 734, 759, 771, 782, 786, 792, 795, or 885, said positions being unique to *Vibrio cholerae* and *Vibrio mimicus* bacterial groups, where said gene fragment can be used for designing a specific gene amplification primer or probe.
2. A gene amplification primer, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides, where one or more nucleotides are at any of positions 21, 96, 107, 126, 153, 190, 258, 270, 279, 285, 357, 543, 552, 557, 600, 690, 702, 714, 729, 733, 734, 759, 771, 782, 786, 792, 795, or 885 in the gene (*gyrB*) encoding the DNA gyrase β subunit of SEQ ID NO: 1 in the sequence listing containing the fragment of claim 1, said positions being unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups.
3. The gene amplification primer of claim 2, wherein a region containing at a high frequency two or more positions unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups as specified in claim 1 is used.
4. The gene amplification primer of claim 2, wherein the 3' terminal nucleotide is a nucleotide at a position that is unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups as specified in claim 1.
5. The gene amplification primer of claim 2, which contains any one of:
 - (1) 5'-tycaywscsaaacttacca-3' or a complementary strand corresponding thereto;
 - (2) 5'-gaaytctggcgtgtcgatcaag-3' or a complementary strand corresponding thereto;
 - (3) 5'-catrtagttgttcaaagtacgg-3' or a complementary strand corresponding thereto;

(4) 5'-ggatttyacytccgaagaaacyagc-3' or a complementary strand corresponding thereto;

(5) 5'-ygccagcttctcattcatr-3' or a complementary strand corresponding thereto;

(6) 5'-cgcttcgcttgggtttcc-3' or a complementary strand corresponding thereto; or

(7) 5'-caataatcttgaacaaacgt-3' or a complementary strand corresponding thereto.

6. A probe for detecting, quantifying, or identifying *Vibrio cholerae* and *Vibrio mimicus*, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides, where one or more nucleotides are at any of positions 21, 96, 107, 126, 153, 190, 258, 270, 279, 285, 357, 543, 552, 557, 600, 690, 702, 714, 729, 733, 734, 759, 771, 782, 786, 792, 795, or 885 in the gene (*gyrB*) encoding the DNA gyrase β subunit of SEQ ID NO: 1 in the sequence listing, said positions being unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups.

7. A fragment of a gene represented by SEQ ID NO: 2 in the sequence listing, which contains one or more nucleotides at any of positions 3, 27, 66, 67, 75, 90, 117, 123, 141, 144, 177, 178, 180, 186, 223, 227, 228, 231, 250, 251, 255, 257, 259, 264, 300, 301, 302, 303, 305, 313, 314, 350, 351, 362, 369, 373, 374, 380, 390, 400, 402, 409, 410, 415, 416, 423, 427, 433, 444, 447, 504, 510, 513, 543, 556, 558, 618, 638, 649, 663, 685, 711, 747, 757, 762, 763, or 789 in a gene (*rpoD*) encoding an RNA polymerase $\sigma 70$ factor of SEQ ID NO: 2, said positions being unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups, where said gene fragment can be used for designing a specific gene amplification primer or probe.

8. A gene amplification primer, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 2 in the sequence listing, where one or more nucleotides are at any of positions 3, 27, 66, 67, 75, 90, 117, 123, 141, 144, 177, 178, 180, 186, 223, 227, 228, 231, 250, 251, 255, 257, 259, 264, 300, 301, 302, 303, 305, 313, 314, 350, 351, 362, 369, 373, 374, 380, 390, 400, 402, 409, 410, 415, 416, 423, 427, 433, 444, 447, 504,

510, 513, 543, 556, 558, 618, 638, 649, 663, 685, 711, 747, 757, 762, 763, or 789 in the gene (*rpoD*) encoding the RNA polymerase $\sigma 70$ factor of SEQ ID NO: 2, said positions being unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups.

9. The gene amplification primer of claim 8, wherein a region containing at a high frequency two or more positions unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups as specified in claim 8 is used.

10. The gene amplification primer of claim 8, wherein the 3' terminal nucleotide is a nucleotide at a position that is unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups as specified in claim 8.

11. The gene amplification primer of claim 8, which contains any one of:

(1) 5'-gattgctgagtatcctggaaccatc-3' or a complementary strand corresponding thereto;

(2) 5'-gaycctaacgacatggaaacc-3' or a complementary strand corresponding thereto;

(3) 5'-ttcwgarctytctgaagcs-3' or a complementary strand corresponding thereto;

(4) 5'-agatgaygmkgctcgysgar-3' or a complementary strand corresponding thereto;

(5) 5'-cgacggtgaaagyagcgacag-3' or a complementary strand corresponding thereto;

(6) 5'-caatgaactgcgcggyaagtt-3' or a complementary strand corresponding thereto;

(7) 5'-gtcagaccaaattcattaac-3' or a complementary strand corresponding thereto;

(8) 5'-gyytgamgcttcagawgcttgrtka-3' or a complementary strand corresponding thereto;

(9) 5'-ygargtrcgcagagtttcaacc-3' or a complementary strand corresponding thereto;

(10) 5'-catyaccaarcgytcttgg-3' or a complementary strand corresponding thereto;

or

(11) 5'-cgytcaacagacagtgawgtc-3' or a complementary strand corresponding thereto.

12. A probe for detecting, quantifying, or identifying the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups, which contains a strand or a complementary

strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 2 in the sequence listing, where one or more nucleotides are at any of positions 3, 27, 66, 67, 75, 90, 117, 123, 141, 144, 177, 178, 180, 186, 223, 227, 228, 231, 250, 251, 255, 257, 259, 264, 300, 301, 302, 303, 305, 313, 314, 350, 351, 362, 369, 373, 374, 380, 390, 400, 402, 409, 410, 415, 416, 423, 427, 433, 444, 447, 504, 510, 513, 543, 556, 558, 618, 638, 649, 663, 685, 711, 747, 757, 762, 763, or 789 in the gene (*rpoD*) encoding the RNA polymerase σ 70 factor of SEQ ID NO: 2, said positions being unique to the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups.

13. A method for detecting, quantifying, or identifying the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups, wherein the primer or the probe of any one of claims 2 to 6 or 8 to 12 is used.

14. A kit for detecting, quantifying, or identifying the *Vibrio cholerae* and *Vibrio mimicus* bacterial groups, wherein the primer or the probe of any one of claims 2 to 6 or 8 to 12 is used.

15. A fragment of a gene represented by SEQ ID NO: 3 in the sequence listing, which contains one or more nucleotides at any of positions 15, 36, 39, 42, 45, 48, 51, 90, 111, 133, 226, 285, 291, 306, 330, 384, 390, 399, 507, 708, 756, 837, 867, 873, 879, 882, or 885 in a gene (*gyrB*) encoding a DNA gyrase β subunit of SEQ ID NO: 3, said positions being unique to the *Vibrio cholerae* bacterial group, where said gene fragment can be used for designing a specific gene amplification primer or probe.

16. A gene amplification primer, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 3 in the sequence listing, where one or more nucleotides are at any of positions 15, 36, 39, 42, 45, 48, 51, 90, 111, 133, 226, 285, 291, 306, 330, 384, 390, 399, 507, 708, 756, 837, 867, 873, 879, 882, or 885 in the gene (*gyrB*) encoding the DNA gyrase β subunit of SEQ ID NO: 3, said positions being unique to the *Vibrio cholerae* bacterial group.

17. The gene amplification primer of claim 16, wherein the 3' terminal nucleotide is a nucleotide at a position that is unique to the *Vibrio cholerae* bacterial group as specified in claim 16.

18. The gene amplification primer of claim 16, wherein a region containing at a high frequency two or more positions unique to the *Vibrio cholerae* bacterial group as specified in claim 16 is used.

19. The gene amplification primer of claim 16, which contains any one of:

(1) 5'-ggtggtaacgcgctytct-3' or a complementary strand corresponding thereto;

(2) 5'-ycgatgaacgtgaagaagataaa-3' or a complementary strand corresponding thereto;

(3) 5'-tgagaaagtcttccacttt-3' or a complementary strand corresponding thereto;

(4) 5'-gttaaagtggaagactttc-3' or a complementary strand corresponding thereto; or

(5) 5'-gggtaagccwgaagatcc-3' or a complementary strand corresponding thereto.

20. A probe for detecting, quantifying, or identifying the *Vibrio cholerae* bacterial group, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides, where one or more nucleotides are at any of positions 15, 36, 39, 42, 45, 48, 51, 90, 111, 133, 226, 285, 291, 306, 330, 384, 390, 399, 507, 708, 756, 837, 867, 873, 879, 882, or 885 in the gene (*gyrB*) encoding the DNA gyrase β subunit of SEQ ID NO: 3 in the sequence listing, said positions being unique to the *Vibrio cholerae* bacterial group.

21. A fragment of a gene represented by SEQ ID NO: 4 in the sequence listing, which contains one or more nucleotides at any of positions 12, 93, 96, 105, 114, 115, 116, 117, 126, 132, 141, 156, 198, 201, 216, 222, 231, 240, 252, 254, 255, 260, 261, 264, 276, 285, 291, 327, 333, 342, 345, 424, 426, 432, 441, 445, 446, 448, 450, 453, 468, 489, 495, 501, 519, 522, 525, 540, 549, 570, 585, 591, 600, 603, 606, 639, 645, 654, 657, 666, 675, 679, 680, 681, 687, 702, 705, 708, 714, 720, 723, 729, 732, 741, 750, 765, 768, 795, or 804 in a gene (*rpoD*) encoding an RNA polymerase $\sigma 70$ factor of SEQ ID NO: 4, said positions being unique to the *Vibrio cholerae* bacterial group, where said gene fragment can be used for

designing a specific gene amplification primer or probe.

22. A gene amplification primer, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 4 in the sequence listing, where one or more nucleotides are at any of positions 12, 93, 96, 105, 114, 115, 116, 117, 126, 132, 141, 156, 198, 201, 216, 222, 231, 240, 252, 254, 255, 260, 261, 264, 276, 285, 291, 327, 333, 342, 345, 424, 426, 432, 441, 445, 446, 448, 450, 453, 468, 489, 495, 501, 519, 522, 525, 540, 549, 570, 585, 591, 600, 603, 606, 639, 645, 654, 657, 666, 675, 679, 680, 681, 687, 702, 705, 708, 714, 720, 723, 729, 732, 741, 750, 765, 768, 795, or 804 in the gene (*rpoD*) encoding the RNA polymerase σ 70 factor of SEQ ID NO: 4, said positions being unique to the *Vibrio cholerae* bacterial group.

23. The gene amplification primer of claim 22, wherein the 3' terminal nucleotide is a nucleotide at a position that is unique to the *Vibrio cholerae* bacterial group as specified in claim 22.

24. The gene amplification primer of claim 22, wherein a region containing at a high frequency two or more positions unique to the *Vibrio cholerae* bacterial group as specified in claim 22 is used.

25. The gene amplification primer of claim 22, which contains any one of:

- (1) 5'-attcttgagcagtttgatcgt-3' or a complementary strand corresponding thereto;
- (2) 5'-caggccgaagagctacgtctc-3' or a complementary strand corresponding thereto;
- (3) 5'-tgagctttctgaagcggatctcgcg-3' or a complementary strand corresponding thereto;
- (4) 5'-gaagatgatgctgtcgtcgaa-3' or a complementary strand corresponding thereto;
- (5) 5'-gaagatgaagacgaagat-3' or a complementary strand corresponding thereto;
- (6) 5'-cggtatcgaccctgaactg-3' or a complementary strand corresponding thereto;
- (7) 5'-catcaagcttctgaagcgtcaga-3' or a complementary strand corresponding thereto;
- (8) 5'-acggaagatatccarcactaa-3' or a complementary strand corresponding thereto;
- (9) 5'-tcaaccaagtgggtcgaattgc-3' or a complementary strand corresponding thereto;

(10) 5'-gcgaacacgatccattgaagtg-3' or a complementary strand corresponding thereto;

(11) 5'-gatgaacgatttcttcggcatc-3' or a complementary strand corresponding thereto;

(12) 5'-aaggactttatccagccac-3' or a complementary strand corresponding thereto;

(13) 5'-ttcttcttgctcacggacttgcg-3' or a complementary strand corresponding thereto;

(14) 5'-ttctgaattgaacggcgatc-3' or a complementary strand corresponding thereto;
or

(15) 5'-tgtctcttgctcgatcattgt-3' or a complementary strand corresponding thereto.

26. A probe for detecting, quantifying, or identifying the *Vibrio cholerae* bacterial group, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 4 in the sequence listing, where one or more nucleotides are at any of positions 12, 93, 96, 105, 114, 115, 116, 117, 126, 132, 141, 156, 198, 201, 216, 222, 231, 240, 252, 254, 255, 260, 261, 264, 276, 285, 291, 327, 333, 342, 345, 424, 426, 432, 441, 445, 446, 448, 450, 453, 468, 489, 495, 501, 519, 522, 525, 540, 549, 570, 585, 591, 600, 603, 606, 639, 645, 654, 657, 666, 675, 679, 680, 681, 687, 702, 705, 708, 714, 720, 723, 729, 732, 741, 750, 765, 768, 795, or 804 in the gene (*rpoD*) encoding the RNA polymerase σ 70 factor of SEQ ID NO: 4, said positions being unique to the *Vibrio cholerae* bacterial group.

27. A method for detecting, quantifying, or identifying the *Vibrio cholerae* bacterial group, wherein the primer or the probe of any one of claims 16 to 20 or 22 to 26 is used.

28. A kit for detecting, quantifying, or identifying the *Vibrio cholerae* bacterial group, wherein the primer or the probe of any one of claims 16 to 20 or 22 to 26 is used.

29. A fragment of a gene represented by SEQ ID NO: 5 in the sequence listing, which contains one or more nucleotides at any of positions 15, 36, 39, 42, 45, 48,

51, 90, 111, 133, 226, 285, 291, 306, 330, 384, 390, 399, 507, 708, 756, 837, 867, 873, 879, 882, or 885 in a gene (*gyrB*) encoding a DNA gyrase β subunit of SEQ ID NO: 5, said positions being unique to the *Vibrio mimicus* bacterial group, where said gene fragment can be used for designing a specific gene amplification primer or probe.

30. A gene amplification primer, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 3 in the sequence listing, where one or more nucleotides are at any of positions 15, 36, 39, 42, 45, 48, 51, 90, 111, 133, 226, 285, 291, 306, 330, 384, 390, 399, 507, 708, 756, 837, 867, 873, 879, 882, or 885 in the gene (*gyrB*) encoding the DNA gyrase β subunit of SEQ ID NO: 3, said positions being unique to the *Vibrio mimicus* bacterial group.

31. The gene amplification primer of claim 30, wherein a region containing at a high frequency two or more positions unique to the *Vibrio mimicus* bacterial group as specified in claim 30 is used.

32. The gene amplification primer of claim 30, wherein the 3' terminal nucleotide is a nucleotide at a position that is unique to the *Vibrio mimicus* bacterial group as specified in claim 31.

33. The gene amplification primer of claim 30, which contains any one of:

- (1) 5'-ggtagtgaatgccctgtca-3' or a complementary strand corresponding thereto;
- (2) 5'-cggatgagcgtgaagaagataag-3' or a complementary strand corresponding thereto;
- (3) 5'-tgaaaaagtattccacttc-3' or a complementary strand corresponding thereto;
- (4) 5'-gttgaagtggaataactttt-3' or a complementary strand corresponding thereto; or
- (5) 5'-wggcaaaccagcckarrtct-3' or a complementary strand corresponding thereto.

34. A probe for detecting, quantifying, or identifying the *Vibrio mimicus* bacterial group, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 5 in the sequence listing, where one or more nucleotides are at any of positions 15, 36, 39, 42, 45, 48, 51, 90, 111,

133, 226, 285, 291, 306, 330, 384, 390, 399, 507, 708, 756, 837, 867, 873, 879, 882, or 885 in the gene (*gyrB*) encoding the DNA gyrase β subunit of SEQ ID NO: 5, said positions being unique to the *Vibrio mimicus* bacterial group.

35. A fragment of a gene represented by SEQ ID NO: 6 in the sequence listing, which contains one or more nucleotides at any of positions 12, 93, 96, 105, 114, 115, 116, 117, 126, 132, 141, 156, 198, 201, 216, 222, 231, 240, 252, 254, 255, 260, 261, 264, 276, 285, 291, 327, 333, 342, 345, 424, 426, 432, 441, 445, 446, 448, 450, 453, 468, 489, 495, 501, 519, 522, 525, 540, 549, 570, 585, 591, 600, 603, 606, 639, 645, 654, 657, 666, 675, 679, 680, 681, 687, 702, 705, 708, 714, 720, 723, 729, 732, 741, 750, 765, 768, 795, or 804 in a gene (*rpoD*) encoding an RNA polymerase $\sigma 70$ factor of SEQ ID NO: 6, said positions being unique to the *Vibrio mimicus* bacterial group, where said gene fragment can be used for designing a specific gene amplification primer or probe.

36. A gene amplification primer, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 6 in the sequence listing, where one or more nucleotides are at any of positions 12, 93, 96, 105, 114, 115, 116, 117, 126, 132, 141, 156, 198, 201, 216, 222, 231, 240, 252, 254, 255, 260, 261, 264, 276, 285, 291, 327, 333, 342, 345, 424, 426, 432, 441, 445, 446, 448, 450, 453, 468, 489, 495, 501, 519, 522, 525, 540, 549, 570, 585, 591, 600, 603, 606, 639, 645, 654, 657, 666, 675, 679, 680, 681, 687, 702, 705, 708, 714, 720, 723, 729, 732, 741, 750, 765, 768, 795, or 804 in the gene (*rpoD*) encoding the RNA polymerase $\sigma 70$ factor of SEQ ID NO: 6, said positions being unique to the *Vibrio mimicus* bacterial group.

37. The gene amplification primer of claim 36, wherein a region containing at a high frequency two or more positions unique to the *Vibrio mimicus* bacterial group as specified in claim 36 is used.

38. The gene amplification primer of claim 36, wherein the 3' terminal nucleotide is a nucleotide at a position that is unique to the *Vibrio mimicus* bacterial group as specified in claim 36.

39. The gene amplification primer of claim 36, which contains any one of:

(1) 5'-cattcttgaacagtttgacaag-3' or a complementary strand corresponding thereto;

(2) 5'-caggcagaagaactacgtctg-3' or a complementary strand corresponding thereto;

(3) 5'-agarctctctgaagccgatctcgct-3' or a complementary strand corresponding thereto;

(4) 5'-gaagatgacgaggtcgcgag-3' or a complementary strand corresponding thereto;

(5) 5'-gaggatgaagatgaagac-3' or a complementary strand corresponding thereto;

(6) 5'-gggtattgaccctgagctc-3' or a complementary strand corresponding thereto;

(7) 5'-taacaaagcatctgaagcttcaag-3' or a complementary strand corresponding thereto;

(8) 5'-gcggaaratatccagtaccag-3' or a complementary strand corresponding thereto;

(9) 5'-tcaaccaaattggtcaaattgt-3' or a complementary strand corresponding thereto;

(10) 5'-acgaacacgatccatcgaggta-3' or a complementary strand corresponding thereto;

(11) 5'-aataaatgatttcttggcatt-3' or a complementary strand corresponding thereto;

(12) 5'-gagyactttatcragccat-3' or a complementary strand corresponding thereto;

(13) 5'-gtcttctgtcactacttttg-3' or a complementary strand corresponding thereto;

(14) 5'-ttggattgaaggcggaata-3' or a complementary strand corresponding thereto;
or

(15) 5'-agtctcytggtcgatcatctgm-3' or a complementary strand corresponding thereto.

40. A probe for detecting, quantifying, or identifying the *Vibrio mimicus* bacterial group, which contains a strand or a complementary strand thereof containing 15 or more continuous nucleotides of SEQ ID NO: 6 in the sequence listing, where one or more nucleotides are at any of positions 12, 93, 96, 105, 114, 115, 116, 117, 126, 132, 141, 156, 198, 201, 216, 222, 231, 240, 252, 254, 255, 260, 261, 264, 276, 285, 291, 327, 333, 342, 345, 424, 426, 432, 441, 445, 446, 448, 450,

453, 468, 489, 495, 501, 519, 522, 525, 540, 549, 570, 585, 591, 600, 603, 606, 639, 645, 654, 657, 666, 675, 679, 680, 681, 687, 702, 705, 708, 714, 720, 723, 729, 732, 741, 750, 765, 768, 795, or 804 in the gene (*rpoD*) encoding the RNA polymerase σ 70 factor of SEQ ID NO: 6 in the sequence listing, said positions being unique to the *Vibrio mimicus* bacterial group.

41. A method for detecting, quantifying, or identifying the *Vibrio mimicus* bacterial group, wherein the primer or the probe of any one of claims 30 to 34 or 36 to 40 is used.

42. A kit for detecting, quantifying, or identifying the *Vibrio mimicus* bacterial group, wherein the primer or the probe of any one of claims 30 to 34 or 36 to 40 is used.